

US-PAT-NO: 4855276  
DOCUMENT-IDENTIFIER: US 4855276 A

TITLE: Solid filtration medium incorporating alumina and carbon

DATE-ISSUED: August 8, 1989

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP
CODE COUNTRY			
Osborne; Michael W.	Lilburn	GA	N/A
N/A			
Afforder; Cynthia A.	Duluth	GA	N/A
N/A			
England; William G.	Sewanee	GA	N/A
N/A			

ASSIGNEE INFORMATION:

NAME	CITY	STATE	ZIP
CODE COUNTRY TYPE CODE			
Purafile, Inc.	Doraville	GA	N/A
N/A 02			

APPL-NO: 07/ 092134

DATE FILED: September 2, 1987

INT-CL: [ 04] G01B031/08,B01J020/08 ,B01J020/20  
,B01J020/04

US-CL-ISSUED: 502/415;55/70 ;55/71 ;55/73 ;55/74 ;423/230  
;423/239 ;423/241  
;423/244 ;423/245.1 ;423/247 ;502/416 ;502/417

US-CL-CURRENT: 502/415; 423/230 ; 423/239.1 ; 423/241 ;  
423/244.02 ; 423/244.03  
; 423/245.1 ; 423/247 ; 502/416 ; 502/417 ; 95/128 ; 95/129  
; 95/132 ; 95/135  
; 95/136

FIELD-OF-SEARCH: 502/415; 502/416 ; 502/417

REF-CITED:

PAT-NO US-CL	ISSUE-DATE	PATENTEE-NAME	
<u>1452739</u> <u>N/A</u>	April 1923 N/A	Hood	502/415
1781664 N/A	November 1930 N/A	<u>Rockwell</u>	423/236
<u>1843355</u> <u>N/A</u>	February 1932 N/A	Behrman	423/499
2196246 N/A	April 1940 N/A	<u>Brown</u> et al.	23/154
<u>2423702</u> <u>N/A</u>	July 1947 N/A	Hart	252/265
2537448 N/A	January 1951 N/A	<u>Engel</u>	23/3
<u>3049399</u> <u>N/A</u>	August 1962 N/A	Gamson et al.	21/53
3226332 N/A	December 1965 N/A	<u>Lincoln</u> et al.	252/184
<u>3360134</u> <u>N/A</u>	December 1967 N/A	Pullen	502/415
3391988 N/A	July 1968 N/A	<u>Friess</u>	23/2
<u>3416293</u> <u>N/A</u>	December 1968 N/A	Alexander	55/73
3578390 N/A	March 1981 N/A	<u>Kruel</u>	23/2
<u>3598521</u> <u>N/A</u>	August 1971 N/A	Alley	23/25
3696629 N/A	October 1972 N/A	<u>Heston, Jr.</u>	62/129
<u>3736726</u> <u>N/A</u>	June 1973 N/A	Grimm et al.	55/73
3819532 N/A	June 1974 N/A	<u>Cracknell</u>	502/415
<u>3842014</u> <u>N/A</u>	October 1974 N/A	Friend	502/415
4072479 N/A	February 1978 N/A	<u>Sinha</u> et al.	55/73
<u>4072480</u> <u>N/A</u>	February 1978 N/A	Wagner	55/73
4113839 N/A	September 1978 N/A	<u>Maki</u> et al.	502/417
<u>4215096</u> <u>N/A</u>	July 1980 N/A	Sinha et al.	423/241
4263268	April 1981	<u>Knox</u>	423/449

N/A	N/A		
<u>4273751</u>	June 1981	Sinha et al.	423/210
<u>N/A</u>	N/A		
<u>4499208</u>	February 1985	<u>Fuderer</u>	502/415
N/A	N/A		

FOREIGN-PAT-NO US-CL	PUBN-DATE	COUNTRY
51436 501/417	April 1980	JP
132635 502/417	October 1980	JP
58-153537	March 1983	JP
58-183941	October 1983	JP
61-54236	March 1986	JP
61-178089	August 1986	JP
406552	June 1974	SU
1219122	March 1986	SU

#### OTHER PUBLICATIONS

Chemical Abstracts, vol. 64, Jan. 3-Jan. 31, 1966.  
 Purakol Media Product Bulletin 135-E.  
 Material Safety Data Sheet, Kina Carbon, Sutcliffe  
 Speakman Carbons LTD,  
 Manufacturer, Mar. 27, 1986.  
 Material Safety Data Sheet, Calgon Carbon Corporation,  
 manufacturer, dated  
 Aug. 1985.  
 Purafil Chemisorbant Media Product Bulletin 125-F.  
 Material Safety Data Sheet, Purafil, Inc.,  
 manufacturer, dated May 19,  
 1986.

ART-UNIT: 116

PRIMARY-EXAMINER: Konopka; Paul E.

#### ABSTRACT:

An adsorbent composition, method of preparing same, and method of treating a fluid stream with the adsorbent are disclosed. Alumina and carbon are combined with water in preferred proportions in one embodiment. Sodium bicarbonate and impregnates such as Group 1A metal hydroxides and Group 7A

salts of Group 1A metals can be added. Improved efficiency of removal of compounds such as hydrogen sulfide is achieved, and ignition temperature is reduced.

15 Claims, 0 Drawing figures

Exemplary Claim Number: 1

----- KWIC -----

Brief Summary Text - BSTX:

Chlorine (Cl.<sub>sub.2</sub>) is a greenish-yellow gas with a suffocating odor. The compound is used for bleaching fabrics, purifying water, treating iron, and other uses. Control of this powerful irritant is most desirable for the well-being of those who work with it or are otherwise exposed to it. At lower levels, in combination with moisture, chlorine has a corrosive effect on electronic circuitry, stainless steel and the like.

Brief Summary Text - BSTX:

See also, for example, French Patent No. 1,388,453, which describes activated carbon granules impregnated with 1% iodine (I.<sub>sub.2</sub>) for this use. South African Patent No. 70/4611 discloses the use of silicate-impregnated activated carbon. Swinarski et al, Chem. Stosowana, Ser. A 9(3), 287-94(1965), (Chemical Abstracts, Vol. 64, 1379c), describe the use of activated carbon treated with potassium salts, including potassium hydroxide (KOH) for hydrogen sulfide adsorption. Activated carbon has also been impregnated with a solution of sodium hydroxide (NaOH) and potassium iodide (KI).

Brief Summary Text - BSTX:

Other uses of impregnated carbon include removing water from air (dessication), see, for example, Soviet Union Patent No. 1,219,122 (activated carbon combined with aluminum oxide; a binder, calcium hydroxide; and lithium bromide); and the removal of acidic contaminants from gas streams, see, for example, U.S. Pat. No. 4,215,096 (activated carbon impregnated with sodium hydroxide and moisture, for the removal of chlorine from gas streams) and U.S. Pat. No. 4,273,751 (activated carbon impregnated with sodium hydroxide and moisture, for the removal of sulfur oxide gases and vapors from gas streams).

Brief Summary Text - BSTX:

The new filtration media embodying the present invention provide improved efficiency in removing H<sub>sub.2</sub>S from gas streams. At some levels of removal efficiency ("breakthrough efficiency"), pellets embodying the invention will last over 90% longer than activated carbon impregnated with sodium hydroxide, and will provide better removal efficiency. Filtration media embodying the invention are also capable of removing chlorine gas and hydrocarbons from gas streams.

Brief Summary Text - BSTX:

The adsorbent composition of the present invention is appropriately used alone in beds for the removal of undesirable compounds. It is also appropriate, however, to use the composition of the present invention in conjunction with beds containing other adsorbents. Such combination is especially appropriate when high levels of chlorine or hydrocarbons are present in the gas stream.

Any such bed may be placed either upstream (before the adsorbent of the present invention with respect to the effluent gas being treated) or downstream.

Detailed Description Text - DETX:

A dry feed mix is prepared of 33% by weight activated alumina DD290, having a loss on ignition factor (LOI) of 6.0; 33% by weight of activated carbon powder 280C, having a surface area in excess of 1000 square meters per gram and passing through a 325 mesh screen; and 33% sodium bicarbonate. The dry feed mix is mixed in a tumbling mill with a 20% aqueous solution of sodium thiosulfate ( $\text{Na}_{\cdot\text{sub.}2}\text{S}_{\cdot\text{sub.}2}\text{O}_{\cdot\text{sub.}3}$ ) sprayed at room temperature onto the dry feed mix while tumbling, in the manner described in U.S. Pat. No. 3,226,332. The resulting pellets are cured in air at 140 .degree. F. for 24 hours, and contain by weight 10%  $\text{Na}_{\cdot\text{sub.}2}\text{S}_{\cdot\text{sub.}2}\text{O}_{\cdot\text{sub.}3}$  and 10% water. The cured pellets are suitable for placement in filter beds for the adsorption of undesirable compounds, particularly chlorine.

Detailed Description Text - DETX:

A study is carried out to evaluate the removal efficiency of the adsorbent composition of the present invention for chlorine gas( $\text{Cl}_{\cdot\text{sub.}2}$ ). A dry feed mix is prepared and impregnated as in Example 2. Curing is as in Example 1. The resulting pellets are screened to 4.times.6 mesh and contain about 10% by weight of moisture, 5% of KOH, and 5% of KI.

Detailed Description Text - DETX:

The testing is carried out in a continuous flow system as described in Example

2. The sample charge weight is 27.5 grams. A test column containing IVP (charge weight 26.61) is simultaneously tested under the same conditions.

Chlorine gas of molecular weight 70.91 is passed through each sample bed at a bed velocity of 75 ft/min and an airflow volume rate of 12,100 milliliters per minute. The residence time of the gas is 0.2 seconds. The Cl.<sub>sub.2</sub> content of the inlet and outlet gas streams is measured using p colorimetric analyzer.

All samples are tested under ambient conditions. The results of these evaluations are summarized in Table 8 below.

#### Detailed Description Text - DETX:

A study is carried out to evaluate the removal efficiency of the adsorbent composition of the present invention for chlorine in a liquid solution. A dry feed mix is prepared by combining, by weight, 5% activated alumina, 50% activated carbon powder, and 45% sodium bicarbonate. Water is added while the dry feed mix is being tumbled in a tumble mill. The activated alumina is known as DD290, having a loss on ignition factor (LOI) of 6.0. The activated carbon powder is known as 207C, having a surface area in excess of 1,000 square meters per gram, and passing through a 325 mesh screen. The sodium bicarbonate is of food grade, sized leaving 28% on a 325 mesh screen. Curing is as in Example 1. The resulting pellet contains about 10% by weight of moisture. The pellets are screened to 4. times. 6 mesh for testing.

#### Detailed Description Text - DETX:

The testing is carried out in a continuous flow system in which the test columns consist of 1.02 inch diameter glass tubes, charged to a bed height of 3

inches. Water containing chlorine in solution is passed through each sample bed. Chlorine is removed from the solution.

Current US Cross Reference Classification - CCXR:

95/132